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#7/Appeal Brief
10/9/02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

THEODORE W. HOUSTON

Serial No. 10/007,839 (TI-23546)

Filed November 8, 2001

For: MEANS FOR FORMING SOI

Art Unit 2813

Examiner Laura M. Schillinger

Commissioner for Patents
Washington, D. C. 20231

Sir:

BRIEF ON APPEAL

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, a Delaware corporation with offices at 7839 Churchill Way, Dallas, Texas 75251.

RELATED APPEALS AND INTERFERENCES

There are no known related appeals and/or interferences.

STATUS OF CLAIMS

This is an appeal of claims 1 to 14, all of the rejected claims. No claims have been allowed.

Please charge any costs to Deposit Account No. 20-0668.

STATUS OF AMENDMENTS

An amendment was not filed after final rejection.

SUMMARY OF INVENTION

The invention relates to a method of forming a semiconductor-on-insulator structure and the product of the process. The step s of the method require initially forming a structure having porous semiconductor material at a first surface thereof and sealing the surface. An epitaxial semiconductor layer is formed on the porous semiconductor material after the sealing step and an oxidizing species is implanted through the epitaxial layer into the porous semiconductor material. The oxidizing species is then reacted with the porous semiconductor material to form a buried dielectric layer beneath the epitaxial layer. The oxidizing species is preferably essentially oxygen and the semiconductor layer is preferably essentially silicon. The sealing step is preferably by heating in a hydrogen ambient.

ISSUE

The sole issue on appeal is whether claims 1 to 14 are anticipated by Blewer et al. (U.S. 5,023,200) under 35 U.S.C. 102(b).

GROUPING OF CLAIMS

The claims do not stand or fall together for reasons set forth hereinbelow under ARGUMENT.

ARGUMENT

Claims 1 to 11 were rejected under 35 U.S.C. 102(b) as being anticipated by Blewer et al. (U.S. 5,023,200). The rejection is without merit.

In order for a rejection under 35 U.S.C.102(b) to be viable, each and every feature of the claim must be found in Blewer et al. This is clearly not the case as will be demonstrated hereinbelow.

Each of claims 1, 4 and 6 requires the step of sealing the surface. No such step is taught or suggested by Blewer et al. either alone or in the total combination as claimed. The final rejection states that this feature is found at colun 4, lines 19 to 22, stating that steam is heated H_2O. While there is no dispute that water, when sufficiently heated, can become steam, there is nothing in the reference to show that the application of steam is a sealing step. It should be noted that none of the suggested sealing procedures set forth in the subject application mention the use of steam. Rather, as stated at page 5, lines 9 to 13, sealing is provided by a bake of the wafer in a nitrogen, hydrogen or inert ambient For this reason alone, Blewer et al. fails to anticipate any of the claims on appeal.

Each of claims 1, 4 and 6 further requires the step of implanting an oxidizing species through the epitaxial layer into the porous semiconductor material. No such step is taught or suggested by Blewer et al. either alone or in the total combination as claimed in conjunction with the method of Blewer et al. or that of the subject application. In this regard, the final rejection states that this step is found at column 1, lines 30 to 45. The material referred to relates to the prior art implantation of oxygen in SIMOX, this has nothing to do with implantation of oxidizing species into porous semiconductor material. Clearly, there is no teaching or suggestion in Blewer et al. to perform this step either alone or in the total combination as claimed to provide a buried oxide layer in porous silicon. Also, for this reason alone, Blewer et al. fails to anticipate any of the claims on appeal..

Claims 2, 3 and 9 depend from claim 1, claims 5 and 10 depends from claim 4 and claims 7, 8 and 11 depend from claim 6 and therefore define patentably over Blewer et al. for at least the reasons presented above with reference to the claims from which these claims depend.

In addition, claim 2 further limits claim 1 by requiring that the oxidizing species consist essentially of oxygen. No such step is taught or suggested by Blewer et al. in the total combination as claimed.

Claim 3 further limits claim 1 by requiring that the semiconductor layer consist essentially of silicon. No such step is taught or suggested by Blewer et al. in the total combination as claimed.

Claim 5 further limits claim 4 by requiring that the semiconductor layer consist essentially of silicon. No such step is taught or suggested by Blewer et al. in the total combination as claimed.

Claim 7 further limits claim 6 by requiring that the oxidizing species consist essentially of oxygen. No such step is taught or suggested by Blewer et al. in the total combination as claimed.

Claim 8 further limits claim 6 by requiring that the semiconductor layer consist essentially of silicon. No such step is taught or suggested by Blewer et al. in the total combination as claimed.

Claims 12 to 14 further limit claims 1, 4 and 6 by requiring that the step of sealing include heating the porous semiconductor material in a hydrogen ambient. No such step is taught or suggested by Blewer et al. either alone or in the total combination as claimed.

CONCLUSIONS

For the reasons stated above, reversal of the final rejection and allowance of the claims on appeal is requested that justice be done in the premises.

Respectfully submitted,

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APPENDIX

The claims on appeal read as follows:

1. A method of forming a semiconductor-on-insulator structure, comprising the steps of:

a) forming a structure having porous semiconductor material at a first surface thereof;

b) sealing said surface;

c) forming an epitaxial semiconductor layer on said porous semiconductor material after said sealing;

d) implanting an oxidizing species through said epitaxial layer into said porous semiconductor material;and

reacting said oxidizing species with said porous semiconductor material to form a buried dielectric layer beneath said epitaxial layer.

2. The method of Claim 1, wherein said oxidizing species consists essentially of oxygen.

3. The method of Claim 1, wherein said semiconductor layer consists essentially of silicon.

4. A method of forming a semiconductor-on-insulator structure, comprising the steps of:

a) anodizing a silicon wafer to form porous silicon;

b) sealing said surface;

c) forming a semiconductor layer on said porous silicon after said sealing;

d) implanting an oxidizing species through said epitaxial layer into said porous semiconductor material; and

e) reacting said oxygen with said porous semiconductor material to form a buried oxide layer.

5. The method of Claim 4, wherein said semiconductor layer consists essentially of silicon.

6. A method of forming a semiconductor-on-insulator structure, comprising the steps of:

a) partially anodizing a silicon wafer to form porous silicon; and thereafter

b) sealing said surface;

c) forming an epitaxial semiconductor layer on said porous silicon;

d) implanting oxygen into said porous silicon through said epitaxial semiconductor layer; and

e) reacting said oxygen with said porous silicon to form a buried oxide layer.

7. The method of Claim 6, wherein said oxidizing species consists essentially of oxygen.

8. The integrated circuit of Claim 6, wherein said semiconductor layer consists essentially of silicon.

9. A product made by the process of Claim 1.

10. A product made by the process of Claim 4.

11. A product made by the process of Claim 6.

12. The method of claim 1 wherein said step of sealing includes heating said porous semiconductor material in a hydrogen ambient.

13. The method of claim 4 wherein said step of sealing includes heating said porous semiconductor material in a hydrogen ambient.

14. The method of claim 6 wherein said step of sealing includes heating said porous semiconductor material in a hydrogen ambient.